EST EQUIPMENT FACILITY



TK 2099AB

Noise Filter Extension Unit

INSTRUCTION MANUAL

MP MASTER
MA30914

MARCONI INSTRUMENTS
DIVISION OF MARCONI ELECTRONICS INC.
100 STONEHURST COURT, NORTHVALE, NEW JERSEY 07647
TELEPHONE: 201/767/7250 • TWX: 710-991-9752

MARCONI INSTRUMENTS LIMITED

INSTRUCTION MANUAL

FOR

NOISE FILTER EXTENSION UNIT

TK 2099AB

Marconi Instruments Ltd.,
St. Albans Hertfordshire England.

M.I. 1.25c
12/75/C

EB 2099AB
1a - 8/73

CONTENTS

Chapter 1 GENERAL INFORMATION

1.1	Introduction	3
1.2	Data summary	3
1.3	Accessories	3

Chapter 2 OPERATION

2.1	Installation	4
2.2	Connections	5
2.3	Selections of filters	5
2.4	Selection of measuring channel filters ...	6
2.5	Use of noise filter extension unit with White Noise Test Set... ...	6

Chapter 3 TECHNICAL DESCRIPTION

3.1	Block diagram	8
3.2	Mixer	8

Chapter 4 MAINTENANCE

4.1	General	11
4.2	Removing the case	11
4.3	Adjustment of preset controls ...	11

Chapter 5 REPLACEABLE PARTS

	Introduction and ordering ...	13
	Parts list	14

Chapter 6 CIRCUIT DIAGRAMS

	Circuit notes	16

Fig.

1.1	General view showing TK 2099AB connected to a White Noise Test Set OA 2090B/4	2
3.1	TK 2099AB band pass section	9
3.2	TK 2099AB band limiting and band stop filter section	10
6.1	Mixer unit	17

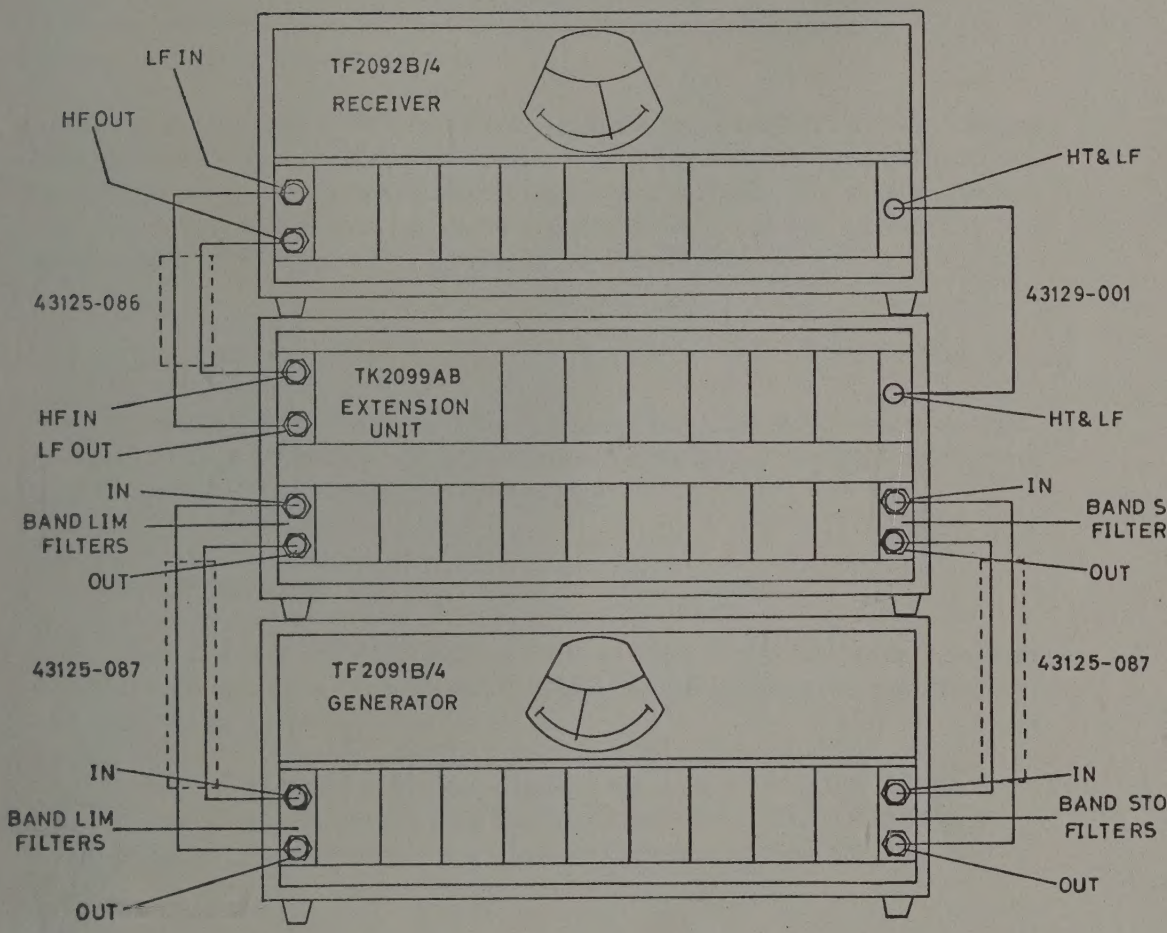


Fig. 1.1 : General view showing TK 2099 AB connected to a White Noise Test Set OA 2090B/4

Chapter 1 GENERAL INFORMATION

1.1 INTRODUCTION

The TK 2099AB Noise Filter Extension Unit has been designed for use with the OA 2090A and OA 2090B White Noise Test Sets. Using the TK 2099AB the filter capacity of the White Noise Test Set is effectively doubled. This is particularly useful when testing a range of multi-channel systems.

In order that the Noise Filter Extension Unit TK2099AB can be used it is necessary for the White Noise Test Sets to be modified to the /4 version. Modification kits are available for this purpose. This instruction manual describes the operation of TK 2099AB in conjunction with either OA 2090B/4 or OA 2090A/4.

1.2 DATA SUMMARY

The TK 2099AB Noise Filter Extension Unit will accommodate up to six filters for use with the White Noise Receiver and up to nine filters for use with the Noise Generator.

1.3 ACCESSORIES

The Noise Filter Extension Unit is supplied with leads enabling it to be connected to the modified White Noise Generator and Receiver. The leads are as follows.

1 off	43129-001V	To connect Receiver	to TK 2099AB
1 set	43125-086F	To connect Receiver	to TK 2099AB
2 sets	43125-087G	To connect Generator	to TK 2099AB

Chapter 2 OPERATION

2.1 INSTALLATION

Fitting Filters and Local Oscillator boards

The band pass filters used in conjunction with the White Noise Receiver are housed in the upper half of the Noise Filter Extension unit. Before fitting the filters remove their front panels and turn them upside down. This ensures that the markings appear the correct way up when the filters are fitted into the unit.

The filter positions in the Extension Unit are marked from 7 to 12 with position 12 being furthest from the selector box. Generally it is better to fit the highest frequency filter in position 7 and the lowest in position 12. Unused positions can be fitted with a Blank Panel Unit, TM 7957.

The leads inside the Extension Unit are marked from 1 to 6 and the oscillator board positions in the selector box are also marked 1 to 6. Position 12 of the Extension Unit corresponds to position 1 marked on the selector box leads.

Fit the band pass filters ensuring that the input leads are connected to the filter inputs. Fit the oscillator boards into the selector box taking care that their frequencies correspond with the band pass filter frequencies. As an example, suppose that a 270 kHz band pass filter is fitted in position 12 of the Extension Unit, then the 270 kHz local oscillator board should be fitted to SKT 600 inside the selector box.

The lower half of the Filter Extension Unit allows up to nine filters to be fitted for use with the Noise Generator. Up to six of the filter positions will be taken up with band stop filters corresponding to the band pass filters fitted in the upper half of the instrument. The remaining positions will be occupied by the extra band limiting filters (low pass and high pass filters).

Begin by fitting the band stop filters into the Extension Unit. For convenience it is usual to fit a band stop filter immediately below the corresponding band pass filter fitted to the upper half of the Extension Unit.

Connect the input lead of the band stop filter fitted in position 12 to the coaxial socket mounted on a bracket on the side panel of the instrument. Interconnect adjacent filters by taking the input lead of one to the output socket of its neighbour. This leaves one output socket vacant and the flying lead which passes through the bracket should be connected to this socket. In this way all of the band stop filters are wired in series.

Having fitted the band stop filters, begin to fit the band limiting filters. If any high pass filters are to be used, fit these first nearest to the side of the instrument. The low pass filters are then fitted. Connect the input lead of the filter nearest the side frame to the coaxial socket mounted on a bracket. Interconnect adjacent filters by taking the input lead of one to the output socket of its neighbour. This leaves one socket vacant and the flying lead which passes through the bracket should be connected to this socket. In this way all of the high pass and low pass filters are wired in series.

2.2 CONNECTIONS

Interconnecting leads (paragraph 1.3) are supplied with the Noise Filter Extension Unit. To interconnect the White Noise Test Set assemble the three instruments as shown in Fig.1.1 and make the connections as follows:-

Using lead 43129-001V interconnect the HT and LF sockets of the Noise Receiver and the Extension Unit.

With lead 43125-086F interconnect the LF IN-OUT and HF IN-OUT sockets of the Noise Receiver and the Extension Unit (connect the Receiver OUT socket to the Extension Unit IN socket and the Receiver IN socket to the Extension Unit OUT socket). The 43125 087G leads are both used to interconnect the Extension Unit with the Noise Generator. One lead runs between the BAND LIM FILTERS IN-OUT sockets and the other between the BAND STOP FILTERS IN OUT sockets.

Connect the Noise Generator and Noise Receiver to a suitable mains supply. The Noise Filter Extension Unit requires no mains supply since it takes its power from the Noise Receiver.

2.3 SELECTION OF FILTERS

a) High pass: Switch IN the required high pass filter located either in the generator or in the filter Extension Unit. All other high pass filters to be switched OUT.

b) Low pass: Switch in the required low pass filter located either in the Generator or in the filter Extension Unit. All other low pass filters to be switched OUT.

c) Band stop: All band stop filters should be switched OUT except the filter required to create a slot within the baseband. This slot may be located in the generator or in the filter Extension Unit.

2.4 SELECTION OF MEASURING CHANNEL FILTERS

The White Noise Receiver must be set to the same frequency as the selected band stop filter.

a) Measuring channel in the receiver: Turn the receiver frequency selector switch to the appropriate position (1-6). The position of the frequency selector switch in the noise filter Extension Unit is immaterial.

b) Measuring channel in the filter extension unit: Turn the receiver frequency selector switch to "EXT" position. Turn the Extension Unit frequency selector switch to the appropriate position (7-12).

2.5 USE OF NOISE FILTER EXTENSION UNIT WITH WHITE NOISE TEST SET

Having interconnected the units in accordance with the instructions given in 1.1 a set-up similar to that illustrated in Fig. 1 will be obtained. Before using the set for npr measurements it is usual to adjust the EQUALIZE RANGE SENSITIVITY controls to equalize the sensitivities of the Noise Receiver filters. The method of adjustment is as follows:-

1) Adjust all EQUALIZE RANGE SENSITIVITY controls to their fully clockwise positions.

2) Switch in ONE high pass and ONE low pass filter to give the noise bandwidth required by the equipment under test. Switch out all band stop filters.

3) Set the required loading level using the output attenuators in conjunction with noise level control. (See instruction manuals for CCIR recommended loading).

4) Switch the Noise Receiver OPERATE/STANDARDIZE switch to OPERATE.

5) Turn the SET REFERENCE control to mid-travel.

6) Switch the fine INPUT ATTENUATOR to 0 dB.

7) Set the FREQUENCY SELECTOR switch of the Noise Receiver to frequency of lowest inband measuring channel.

8) Adjust the coarse INPUT ATTENUATOR until the meter reading is close to the REF mark on the meter.

9) Use the frequency selector switch to select all the appropriate measuring channel frequencies in turn and note which position gives the lowest meter reading.

10) Select this position.

11) Adjust the SET REFERENCE control of the Noise Receiver to give a meter reading on the REF mark.

12) Using the FREQUENCY SELECTOR switches, switch to other filter frequencies in turn and adjust the appropriate EQUALIZE RANGE SENSITIVITY control to bring the meter reading down to the REF mark.

13) Leaving the SET REFERENCE control in the same position turn the skirt of the coarse INPUT ATTENUATOR until the 0 symbol is coincident with the black indicating arrow.

The skirt is turned by pushing it towards the front panel and rotating it, when clicks corresponding to each position will be felt. With the attenuator controls set in this position it will be noted that the indicated n.p.r. is 0 dB.

The noise receiver system is now correctly set up to measure noise power ratio with all ranges having a common reference point.

Measurement of noise power ratio is conducted in accordance with the instructions given in Sect. 2.6 of the OA 2090B or Sect. 2.6 of OA 2090A instruction manual. The chief difference being that a greater range of filters can be selected because of the use of the Noise Filter Extension Unit. Note that the Extension Unit filters are only brought into operation when the FREQUENCY SELECTOR switch on the Noise Receiver is set to the EXT position and when attempting to use the filters in the Extension Unit ensure that the switch is in the correct position.

In the Noise Filter Extension Unit the frequency selector switch has a seventh position which is not labelled and not used.

Chapter 3 TECHNICAL DESCRIPTION

3.1 BLOCK DIAGRAM

The block diagram for the Noise Filter Extension Unit is shown in Figs.3.1 and 3.2. Fig.3.1 shows the Band Pass Filter section of the instrument and Fig.3.2 shows the Band Limiting and Band Stop filter section.

3.2 MIXER

The Mixer has a two stage wideband amplifier with an input impedance of 750 Ω. A feedback pair TR300, TR301, provides voltage amplification and is designed for a low level of inherent noise. The second stage, an emitter follower, provides a low impedance to drive the mixer circuit which follows. The gain of the amplifier is preset to 22 dB by R304 in the feedback loop of the first stage.

A high pass filter (C307, L301, C308) attenuates all frequencies below 10 kHz at the mixer input to reduce any unwanted noise introduced in the wideband amplifier. The mixer TR303 presents an input impedance of 75 Ω.

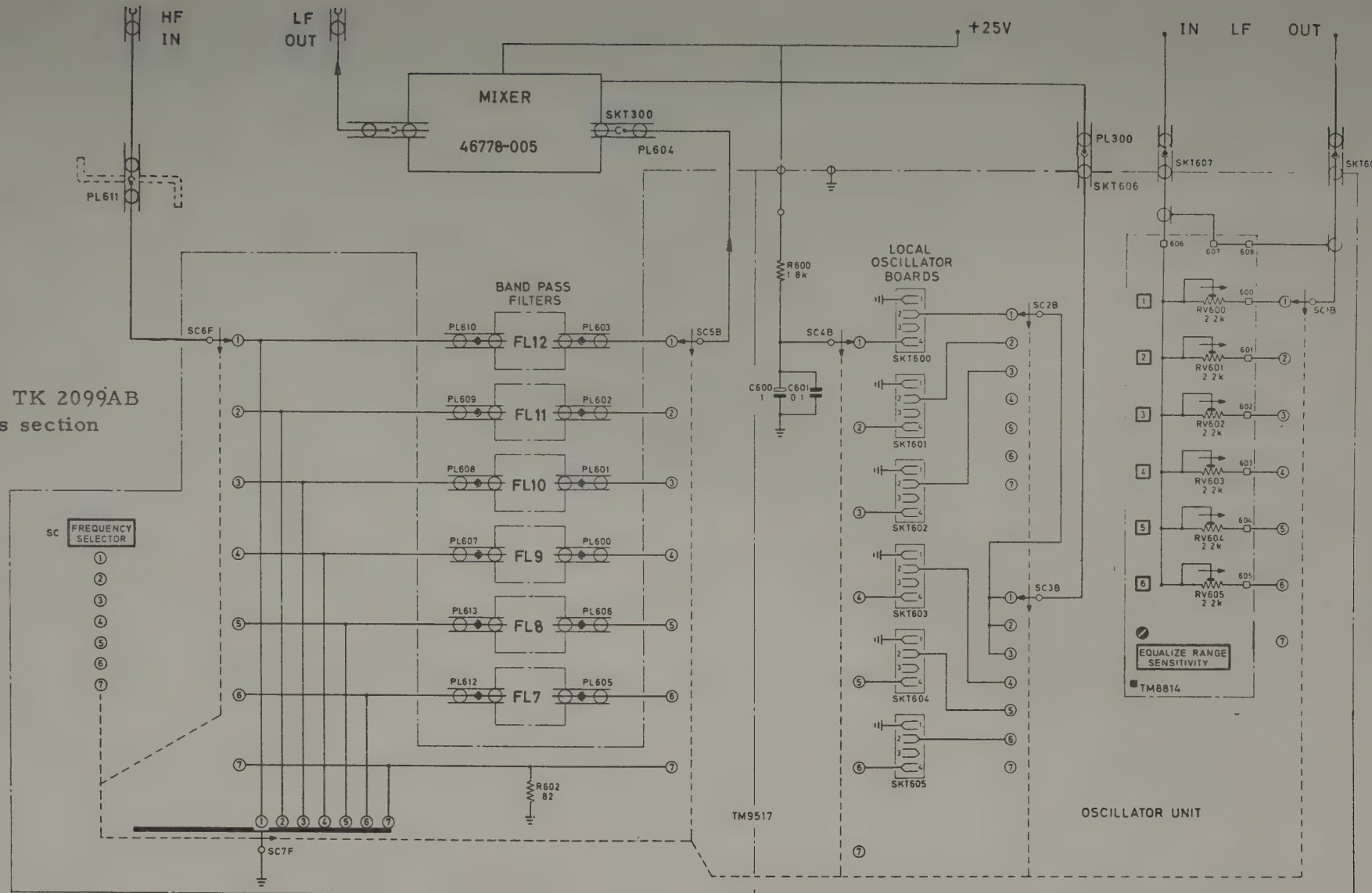


Fig. 3.1 TK 2099AB
Band Pass section

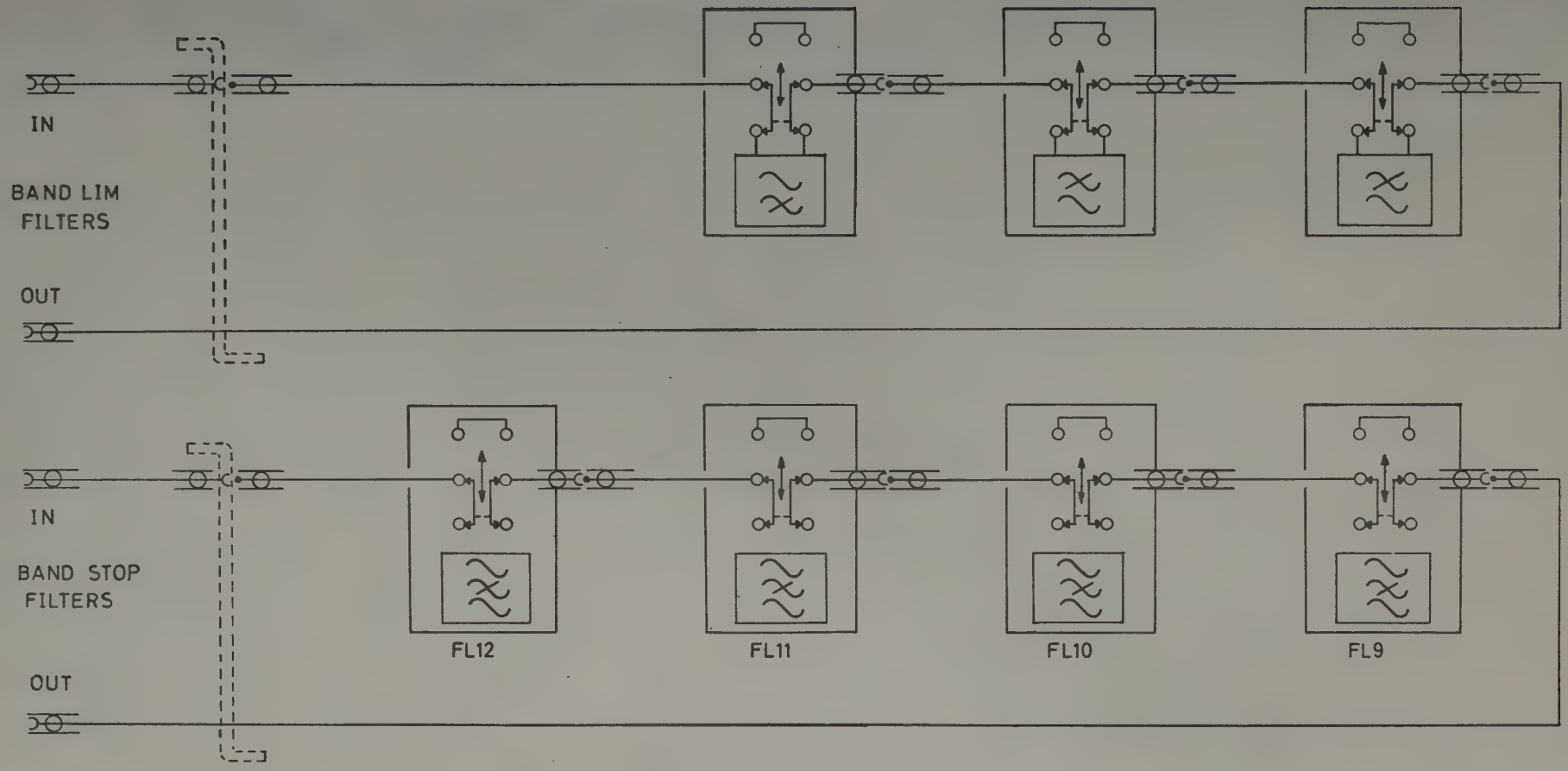


Fig. 3.2 : TK 2099AB band limiting and band stop filter section

4.1 GENERAL

This chapter of the manual serves as a general guide to the servicing of the instrument. In case of difficulties please phone or write to our Service Division of nearest Area Office or Agent. Always mention the type number and serial numbers of your instruments.

Semiconductor devices are used in this instrument, and, although they have inherent long term reliability and mechanical ruggedness, they are easily damaged by overloading, reversed polarity and heat or radiation. Avoid prolonged soldering, strong r.f. fields or short circuits. Do not use insulation testers. Always allow a few seconds for the h.t. lines to discharge before attempting any operation on the internal components.

It may be desirable after some time to clean and lubricate the switch contacts, using benzine or white spirit (not carbon tetrachloride) and lubricating with a suitable lubricant such as 1% petroleum jelly in white spirit.

4.2 REMOVING THE CASE

The case is held on by four 2BA chrome screws. The rack mounting version has top and bottom covers secured by a screw at each corner.

4.3 ADJUSTMENT OF PRESET CONTROLS

Equalize Range Sensitivity Controls

The method of adjustment of these controls is fully described on page 6.

Mixer Unit 46778-005A

Preset controls:	R304, C302, R313.
Test equipment:	Signal generator. 10 kHz - 15 MHz e.g. MI types TF 144H or TF 2002AS with 50/75 matching pad.
	Valve voltmeter, d.c. to 15 MHz; e.g. MI type TF 2604.

The mixer unit consists of a wideband amplifier stage with a voltage gain of 22 dB followed by a mixer stage with a voltage conversion gain of approximately 10 dB. However, it is not possible to measure directly the gain of the mixer unit because of the high level of local oscillator signal at the mixer output socket SKT301. The gain is, therefore, measured for:

a) the wideband amplifier and

b) the mixer stage with part of the l.f. amplifier.

To check the wideband amplifier, connect the signal generator to SKT300 and the voltmeter to tag 307 of the mixer board. With the generator set to 100 kHz and 10 mV, the voltage at pin 307 should be 126 mV. If any components have been replaced, the gain can be reset by adjusting R304. The amplifier frequency response should be flat to better than 1 dB from 10 kHz to 13 MHz when the mixer cover is fitted. C302 is the preset but should only be adjusted with a specialized test fixture.

To check the mixer, remove the link across tags 307 and 308, switch to the lowest frequency local oscillator and connect the signal generator to tag 308, the input to the mixer. Set the signal generator frequency to about 500 Hz different from the local oscillator and set the level to 1mVMonitor the voltage at the top of RV1 (SET REFERENCE control) with this control turned fully anti-clockwise. Between the mixer output socket SKT301 and this point, the l.f. amplifier has a gain of approximately 40 dB, thus the gain measured between tag 308 and RV1 should be 50 dB. If necessary, adjust R313 on the mixer board for maximum output on the voltmeter which should read 320 mV approximately.

Chapter 5 REPLACEABLE PARTS

INTRODUCTION

This chapter lists replaceable parts in alphabetical order of their circuit references. The following abbreviations and symbols are used:

C	:	capacitor
Carb	:	carbon
Cer	:	ceramic
Elec	:	electrolytic
L	:	inductor
Met	:	metal
Ox	:	oxide
Plas	:	plastic
R	:	resistor
RV	:	variable resistor
SKT	:	socket
TE	:	total excursion
VT	:	transistor
†	:	value selected during test; nominal value listed.
W	:	watts at 70°C.

ORDERING

Orders for replacement parts should be sent to our Service Division at the following address:

Marconi Instruments Service Division,
Luton Airport,
Luton,
Bedfordshire.

Tel. Luton 33866

Specify the following information for each part required.

1. Type and serial number of instrument
2. Circuit reference
3. Description
4. MI code number

If a part is not listed state its function, location and description when ordering.

Circuit reference	Description	M.I. code
Mixer unit		46778-005A
C300	Plas 0.22μF 10% 63V	26582-406
C301 †	Plas 68pF ±2pF 125V	26516-201
C302	Var Cer 4-20pF	26847-243
C303	Cer 0.1μF -25+50% 30V	26383-031
C304	Elec 22μF -20+100% 40V	26423-222
C305	Elec 10μF -20+100% 63V	26423-215
C306	Cer 0.1μF -25+50% 30V	26383-031
C307	Plas 0.33μF 10% 63V	26582-408
C308	Plas 0.33μF 10% 63V	26582-408
C309	Cer 0.1μF -25+50% 30V	26383-031
C310	Elec 22μF -20+100% 40V	26423-222
C311	Elec 100μF -20+100% 10V	26423-240
C312	Cer 0.1μF -25+50% 30V	26383-031
C313	Cer 0.01μF -20+80% 100V	26383-055
C314	Cer 0.1μF -25+50% 30V	26383-031
C315	Cer 0.1μF -25+50% 30V	26383-031
C316	Cer 0.1μF -25+50% 30V	26383-031
C317	Elec 100μF -20+100% 25V	26423-243
C318	Cer 0.1μF -25+50% 30V	26383-031
L300	Inductor 4.5μH	44221-013
L301	Inductor 1mH	44261-009
PL300	75Ω BNC	23443-335
R300	Met ox 750Ω 2% ½W	24573-070
R301	Met ox 220Ω 2% ½W	24573-057
R302	Met ox 1MΩ 2% ½W	24573-145
R303	Met ox 2.7kΩ 2% ½W	24573-083
R304	Var carb 1kΩ 20% 1/4W	25611-072
R305	Met ox 1.8kΩ 2% ½W	24573-079

Circuit reference	Description	M.I. code
R306	Met ox 2.7kΩ 2% ½W	24573-083
R307	Met ox 2.2kΩ 2% ½W	24573-081
R308	Met ox 100Ω 2% ½W	24573-049
R309	Met ox 47Ω 2% ½W	24573-041
R310	Met ox 820Ω 2% ½W	24573-071
R311	Met ox 7.5kΩ 2% ½W	24573-094
R312	Met ox 47kΩ 2% ½W	24573-113
R313	Var WW 2.2kΩ 10% 1W	25811-021
R314	Met ox 2.2kΩ 2% ½W	24573-081
R315	Met ox 75Ω 2% ½W	24573-046
R316	Met ox 5.1kΩ 2% ½W	24573-090
R317	Met ox 470Ω 2% ½W	24573-065
R318	Met ox 1kΩ 2% ½W	24573-073
R319	Met ox 2.2kΩ 2% ½W	24573-081
R320	Met ox 680Ω 2% ½W	24573-069
R321	Met ox 22kΩ 2% ½W	24573-105
R322	Met ox 10kΩ 2% ½W	24573-097
R323	Met ox 100Ω 2% ½W	24573-049
R324	Met ox 1.6kΩ 2% ½W	24573-078
R325	Met ox 150Ω 2% ½W	24573-053
SKT300	75Ω BNC	23443-508
SKT301	75Ω BNC	23443-508
TR300	BC239	28452-771
TR301	BC109	28452-777
TR302	BC109	28452-777
TR303	BC109	28452-777
TR304	BC108	28452-787
TR305	BC109	28452-777

CIRCUIT NOTES

1. COMPONENT VALUES

Resistors: No suffix = ohms. k = kilohms. M = megohms.
Capacitors: No suffix = microfarads. p = picofarads.
† value selected during test; nominal value shown.

2. VOLTAGES

These are d.c. and relative to chassis unless otherwise indicated. Measured with 20 kΩ/V meter.

3. SYMBOLS


arrow indicates clockwise rotation of knob.



etc., external front or rear panel marking.



tag on printed board.


other tag.


feed-through tag.


screwdriver adjustable preset.


signal path.


feedback path.

4. SWITCHES

Rotary switches are drawn schematically. Numbers or letters indicate control knob setting.

1F = 1st section (front panel), front
1B = 1st section, back
2F = 2nd section, front
etc.

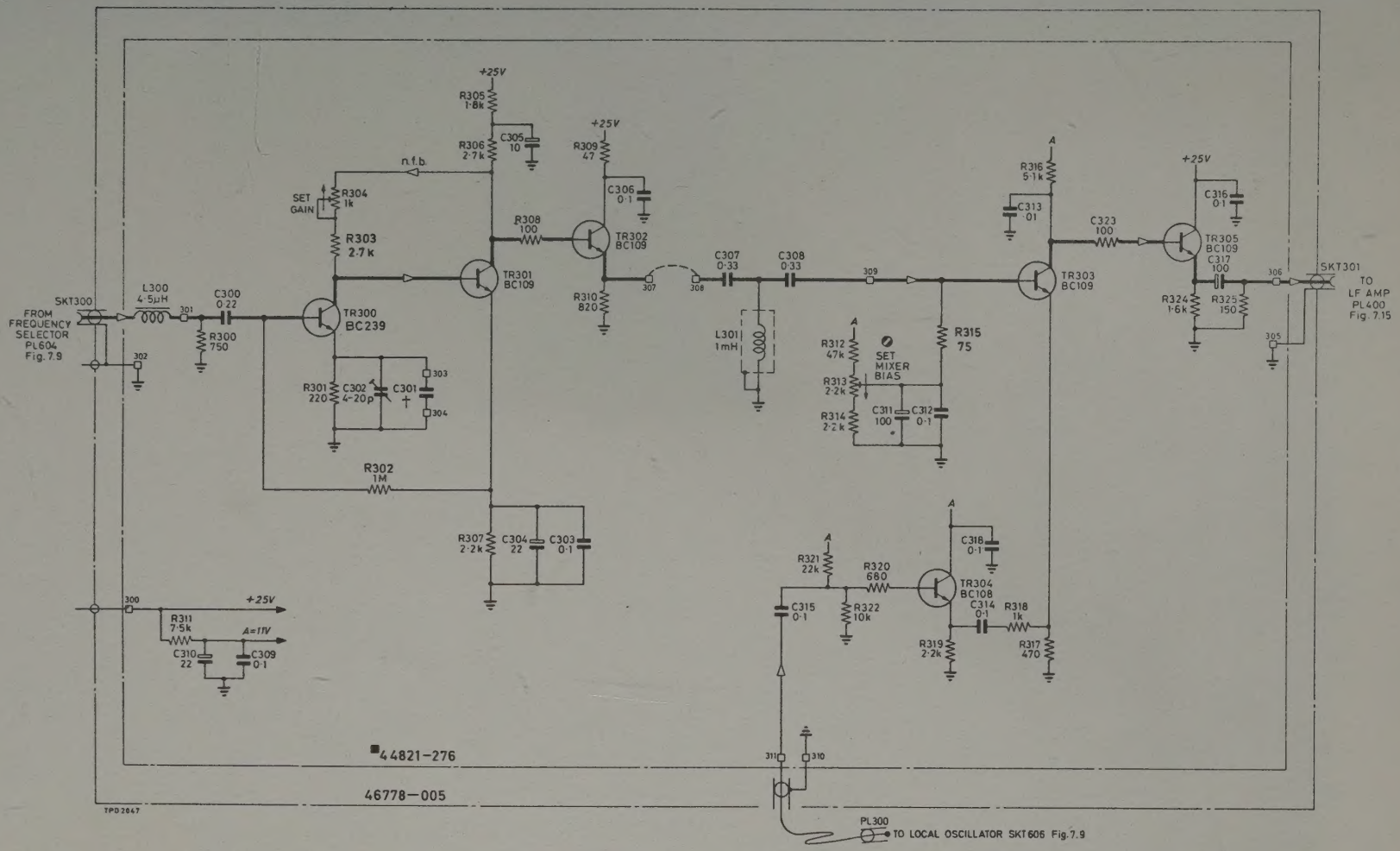


Fig. 6.1 : Mixer unit

MARCONI INSTRUMENTS LIMITED

SERVICE DIVISION

THE AIRPORT, LUTON,
BEDFORDSHIRE LU2 9NS

Telephone : Luton 33866

HOME and EXPORT SALES OFFICES

LONGACRES, ST. ALBANS,
HERTFORDSHIRE AL4 0JN

Telephone : St. Albans 59292
Telegrams : Measurtest, St. Albans
Telex : 23350

U.S.A.

MARCONI INSTRUMENTS DIVISION,
MARCONI ELECTRONICS INC.,
100 STONEHOUSE COURT, NORTHVALE,
NEW JERSEY 07647

Telephone : (201) 767-7250
Telex : 710-991-9752

BUNDESREPUBLIK DEUTSCHLAND

MARCONI MESSTECHNIK G.m.b.H.,
P.O. BOX NO. 210330
JOERGSTRASSE 74
8 MUNICH 21

Telephone : 582041
Telex : 05 24642

FRANCE

MARCONI INSTRUMENTS,
SUCCURSALE DE FRANCE,
32 AVENUE DES ECOLES,
91600 SAVIGNY SUR ORGE

Telephone : 921.93.86
Telex : 60541

A GEC MARCONI ELECTRONICS COMPANY

MP MASTER



MA30914

Printed in England